# PATENT ABSTRACTS OF JAPAN

(11)Publication number : **05-183461**

(43)Date of publication of application : **23.07.1993**

(51)Int.Cl. H04B 1/16

(21)Application number : **04-155350**

(22)Date of filing : **15.06.1992**

(71)Applicant : **HUGHES AIRCRAFT CO**

(72)Inventor : **KELLEY EDWIN A**

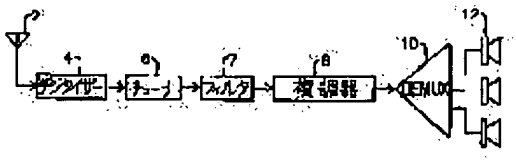
(30)Priority

Priority number : **91 714492** Priority date : **13.06.1991** Priority country : **US**

## (54) TIME DIVISION MULTIPLEX DIGITAL RECEIVER USED BY PLURAL USERS AND METHOD THEREFOR

(57)Abstract:

PURPOSE: To perform the plural simultaneous accesses of signals and to eliminate redundant performance by digitizing reception analog RF signals, selecting plural desired frequencies, separating interference signals and performing demodulation and an acoustic processing.



CONSTITUTION: RF signals received from an antenna 2 are converted to a digital form in a digitizer 4 and the desired frequency is selected based on time division multiplex in a tuner 6. Then, the samples of continuous reception signals are combined with each other inside continuous strings. A filter 7 is a time division multiplex FIR(finite impulse response) filter and performs channel separation filtering for continuously time division multiplexed samples. Digital modulation is performed synchronized with tuner multiplication inside a demodulator 8 and the acoustic processing is performed based on the time division multiplex. Processed signals are made analog and separated into independent analog streams in a demultiplexer 10 and users use the signals by using independent speakers 12.

LEGAL STATUS

| | |
|---|---|
| [Date of request for examination] | 15.06.1992 |
| [Date of sending the examiner's decision of rejection] | 29.08.1995 |
| [Kind of final disposal of application other than the examiner's decision of rejection or application converted registration] | |
| [Date of final disposal for application] | |
| [Patent number] | 2831512 |
| [Date of registration] | 25.09.1998 |
| [Number of appeal against examiner's decision of rejection] | 07-025724 |
| [Date of requesting appeal against examiner's decision of rejection] | 27.11.1995 |
| [Date of extinction of right] | 25.09.2004 |

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the digital receiving system which can be especially served for two or more users at coincidence, and its approach about a digital RF receiver.
[0002]
[Description of the Prior Art] Amplitude modulation (AM) and frequency modulation (FM) are used for the conventional radio system for automobiles. There are many things by which reception and transmission are equipped with cell-like (cellular) radio in an automobile. The services use other parts of an electromagnetic spectrum, and it will be expected in the future that operations are or current operation is carried out and which can be added are facsimile, a computer, and a global location detection system (GPS:global positioning system).
[0003]
[Problem(s) to be Solved by the Invention] Receiving various services has the complicated problem again, when supplying service to two or more users at coincidence. For example, while radio is operating on AM or FM, capacity which can perform a cell-like telephone call is desired. Moreover, while a different user combines with one communication system like the separate headphone assigned to different PAX at coincidence and the PAX can receive the radio station according to individual, it is expected that other PAX uses a cell-like telephone (cellular phone) and a respectively separate radio station can be received. Different broadcast-band regions differ very much in the bandwidth, a modulation technique, and band actuation. The conventional approach of using two or more channels of two or more bands only provides two or more receivers with the separate receiver only assigned to each band. When two or more use ****** capacity is expected a single channel by coincidence, two or more receivers are only used for the single channels. An additional receiver has respectively a sacrifice about cost, weight, power, and occupancy space.
[0004] It can respond to the modulation of a class which is very different with a single receiver configuration, and thinks as a receiver which does not need the receiver of a class which is different in each service band, and a digital receiver is ********. Since all of channel selection frequency alignment, channel separation, and a modulation are performed in digital one, only a single digital receiving path is needed for all these functions. A change of a different broadcast type and bandwidth is made by only changing the filter coefficient of a digital filter, and the recovery algorithm of a programmable demodulator. Such a system is the United States patent application under this invention and coincidence continuation, and an application number. It is indicated to 07/293,894 (the June, 1989 application, artificer:Stone et al.), and this invention is transferred to the fuse aircraft company (Hughes Aircraft Company) which is the same grantor as this invention. Although the patent application under this coincidence continuation uses digital count common to a different service band and reduces the complexity and cost of a system sharply, it cannot provide two or more users with service at coincidence. In order to give one's service to two or more users at coincidence, two or more receivers are needed.

[0005] Other digital receivers are Dieter. It is indicated by the report ("Society of Automotive Engineers Technical Paper Series"International Congress and Exposition, Detroit, PaperNo. 861039, 1986, pages 77 -84) by Baecher. Now, not RF sample but IF (intermediate frequency) sample is indicated. In order to process one input signal at once and to process two or more signals by which a sample is carried out by IF, two or more digital receivers are required for this.
[0006] The digital receiver which can process some kinds of two or more signals to coincidence is indicated by J.Ashjaee as a GPS receiver (28 "Ashtech XII GPS Receiver"IEEE International Position Location & Navigation Symposium, November 1988). However, this system is inapplicable to utility service like the shape of FM, AM, or a cell. This system was designed for a system like GPS by which a different code is offered, although all the channels were broadcast on the same frequency. This receiver processes many signals by the code division multiplexer (codedivision multiplexing). United States patent No.4,884,265 (artificer: Schroeder et al., grantor:Loral Corporation) A frequency division multiplexer input signal is digitized. The digitized sample generates the real number and imaginary part corresponding to topology within the original modulating signal by being mixed with base band (baseband) signalling frequency in frequency. After conversion is filtered within the real number and an imaginary digital filter. The modulation information on original is restored by analyzing the location of the vector within the complex flat surface expressed by the real number and the imaginary. If it is a request, conversion will be performed by calculating the product of the digital value and the input sample corresponding to the sine and cosine in a base band frequency of a local oscillation signal. Using preliminary selection filtering and reducing the amount of after treatment before conversion, is proposed. Although this is important for the design of a digital receiver, reference is not made about solution of the problem about such signal processing by the system indicated by this invention.
[0007]
[Means for Solving the Problem and its Function] This invention is set to the wavelength band which can be distributed in a wide range frequency, receives and processes a RF signal, makes possible two or more concurrent access of a signal in such a band, is comparatively cheap and offers the digital method which eliminates the redundant engine performance which is in a system conventionally, and its equipment.
[0008] In order to attain such a purpose, the RF signal which received is digitized and is detected by the digital tuner. This tuner is chosen from the signal by which two or more request frequencies were digitized. Request signalling frequency is chosen based on time division multiplex, and time division multiple processing is performed also for a following digital modulation and a following acoustical treatment.
[0009] Since it is possible to simultaneous processing of a different service band, the separated finite impulse response (FIR:finite impulse response) filter is prepared in each separation service band. Each filter contains the coefficient memory and accumulator which are used for a specific service band. The signalling frequency to which the multiplexer of each band was carried out is multiplied by the multiplier of each FIR filter memory in common compound MARUCHIPU Praia. Consequently, false rumor RUCHIPU REXX of the signal is carried out, and it is sent to each accumulator. A data rate decreases sharply here at the rate determined according to the description of an FIR multiplier. A digital demodulator and the acoustical-treatment section process the output of each accumulator separately on the basis of time division multiplex suitably. Thereby, the digital demodulator and acoustical treatment by the single programmable digital signal processor (DPS) become possible.
[0010] When selection of the wave number is desired two or more rounds from a single service band, only a single FIR filter is needed. A common FIR multiplier is applied, as a result, within each accumulator, false rumor RUCHIPU REXX of the signal is carried out, and it is distributed by the signal of a different frequency by which time division multiplex was carried out. In actuation in two or more bands, a recovery and an acoustical treatment are suitably performed to the contents of each accumulator based on time division multiplex. The output is changed into the analog format suitable for use by the user.
[0011]

[Example] This invention enables simultaneous processing of different signalling frequency which could distribute to a different service band or has gathered in a single service band. While this invention can suit the service band of a large number which are [ GPS / the above-mentioned facsimile, a computer, ] different, on these specifications, explanation is given for the purpose of an understanding also with FM, AM, and a cell-like service band. A broadcast-band region (87.9-107.9MHz, 0.540-1.600MHz, and 865-895MHz) is respectively assigned to these services.

[0012] Drawing 1 is the plan showing an approach for this invention, multiprocessing with two or more round wave number in a service band is offered, and a user is obtained by coincidence in the output of a different selected frequency. An antenna 2 receives various broadcast signals. This is prepared as a set of the separate antenna for [ each ] service bands. The RF signal which received is changed into a digital format by the digitizer 4. The sample of the input signal as which a desired frequency is chosen by the digital tuner 6 based on time division multiplex and which the selected frequency follows is together put mutually within the continuing string. A digital filter 7 is a time-division-multiplex FIR filter, and this filter performs channel separation filtering about the continuous sample by which time division multiplex was carried out.

[0013] A digital recovery is performed synchronizing with the multiplication of the tuner in the digital demodulator 8. Moreover, an acoustical treatment is performed on the basis of digital time division multiplex. The processed signal is changed into analog format and divided into the analog stream which became independent by the demultiplexer 10. Here, a user can use the signal using the independent loudspeaker 12 or other output units.

[0014] The detail of the suitable example of this invention is shown in drawing 2 . Three antennas 14a, 14b, and 14c are shown in this drawing, and these are antennas respectively used for AM, FM, and a cell-like method. The signal received in each service band is amplified with each amplifier 16a, 16b, and 16c, and is sent to each RF ANCHIA Lias filters (ant-alias filter) 18a, 18b, and 18c. Although the property of these filters is changed depending on specific application and a demand item, the linear phase and what is close to the minimum loss are desired. Generally a filter has the suitable passband limited on suitable attenuation level like -3dB, and this band is crossed to the highest frequency from the lowest frequency of a service band. Extent of the filter skirt board (namely, field between the stop band edges which adjoin a passband edge) from the spectrum image [ ARAIASU / the location of the stop band edge defined in bands other than a passband by suitable refusal level like -100dB / image / depending on the digital sample rate ] does not block the passband of a request spectrum image.

[0015] The filtered signal is sent to an analog-to-digital converter (ADC) 20. All the bands changed according to the shape (0.540-895MHz) of AM, FM, and a cell are bandwidth which is generally too wide in single ADC of a design conventionally. However, conversion of the service band of the spectrum adjacent part which it occupies is application under coincidence continuation application by the artificer of this invention which was filed on the same day as this application, and was transferred to the fuse aircraft company (Hughes Aircraft Company). It is shown in "two or more band digital receiver for reducing bandwidth, and its approach" ("Multi-BandDigital Reciving Apparatus and Method With Bandwidth Reduction"). When the service band conversion technique shown by said application under coincidence continuation is used, single ADC can be used to each of these service bands of all. When not using this, ADC which became independent to each service band must be used.

[0016] the sample rate of ADC is changed depending on the image location by which (b) signaling information bandwidth, the highest signal frequency, and (c) ARAIASU were carried out [ whether (a) base band or a passband sampling is used and ]. A basic cycle sampling needs the frequency twice [ at least ] the sample rate of the highest contained in the signal by which a sample is carried out. If a sample rate is twice [ at least ] the signal bandwidth offered with RF ANCHIA Lias filters 18a, 18b, and 18c, the sample rate lower than the frequency of a low band edge of it will become possible by band pass sampling. Other information about a request sample rate is Stoe under coincidence continuation. et It is provided for application by al.

[0017] An a large number user's station selection (station selection) is offered by the compound coincidence tuner surrounded by the dotted line 22. This tuner consists of corrected programmable direct

digital frequency synthesizers. Each user is provided with station selection 24a, 24b, and 24c, and a user chooses desired AM or desired FM station. Selection of an office can also be made only into for [ of others like a cell-like telephone ] services. The Gentlemen phase incrementers (incrementer) 26a, 26b, and 26c to each selected station are carried out as an accumulator, the stairway of the phase value which inclined mostly is generated, and this phase value is a frequency determined by the phase increment applicable to the selected station frequency. In order to maintain the frequency coherence (coherence) in many frequencies, accumulation of a phase is performed by another accumulator about each frequency. however, additional hardware required for a phase increment register and an accumulator -- **** -- it is small.

[0018] Time division multiplex of the phase increment accumulators 26a, 26b, and 26c is carried out by the multiplexer 30. This multiplexer 30 combines accumulated various signals at once on single Rhine. A multiplexer sample rate is controlled by the clock 32. The output of a multiplexer 30 is supplied to a sine / cosine read only memory (ROM) 34. This ROM stores the code for changing the value accumulated by Accumulators 26a, 26b, and 26c into the sine and cosine output which were digitized, and this code is the real component and mulberry DORACHUA component of a frequency which were compounded in digital one. An output sine wave form has desirable resolution, and needs about 14 bits of about 216 inputs in ROM. The digital sine and digital cosine output by which the sample was carried out are the same frequency as the carrier frequency of the station aligned and chosen. The clock of a frequency higher than a phase incrementer is inputted, and a sine / cosine reference ROM generates two or more frequency WORD. For example, when a 10MHz clock uses three incrementers inputted respectively, the sample rate by which a sine / cosine ROM 34 is accessed is 30MHz.

[0019] The output of a sine / cosine ROM 34 is supplied to compound MARUCHIPU Praia 36, and is mixed with the input digitized from ADC20 here. Here, compound mixing is used. Because, it is because all spectrums are shifted to single direction by this so that it can distinguish from "real" mixing (that is, small or 1 time of multiplication is applied), and this mixing generates the bent duplex image. Real mixing generates four images of an original positive and negative spectrum image as this field is sufficient and it is known.

[0020] The compound output of a digital compound mixer (MARUCHIPU Praia) is sent to a finite pulse response (FIR) filter configuration. This filter configuration functions as a band-pass filter to each service band by which the multiplexer was carried out. Separated FIR ROM 38a, 38b, and 38c store the FIR multiplier to each separated service band. FM station from which all of three users differ -- ****** -- single FIR which has FM multiplier when only a single service band [ like ] is used Only ROM is needed. Although the number of the multipliers about each ROM is changed according to an original sample rate and the original last data rate, generally it is settled in about 20 to 200 number.

[0021] FIR ROM is accessed in a time-division-multiplex format, and this access synchronizes with the signal multiplexer from a tuner by the multiplexer (multiplexer) 40. This multiplexer 40 is also operating on the radical of control of a clock 32. FIR [ as opposed to / in 2nd compound MARUCHIPU Praia 42 / each service band in the digital signal over each service band from a tuner 22 ] The multiplier of ROM is applied. This multiplication result is sent to the accumulators 46a, 46b, and 46c to each station divided and chosen as three data streams by the demultiplexer (demultiplexer) 44. The continuous multiplier corresponding to that service band in each continuous input data to compound MARUCHIPU Praia 42 is applied, and the accumulators 46a, 46b, and 46c of each selected station add this multiplication result to each input signal. Therefore, the data rate of an accumulator output decreases sharply with a factor equal to the number of the FIR multipliers about the sample rate of the input signal.

[0022] It is filtered, and the acoustical treatment of the accumulated sample to each selected station is restored to it and carried out. Suitably, a single digital signal processor (DSP) is used for all stations. TMS320C30 of Texas Instruments (Texas Instruments) DSP is suitable for this purpose. The signal-processing software used for FM modulation and an acoustical treatment (the recovery of a stereo is included) is TMS320C30, although the highest instruction rate of 10MIPS (million instructions per second) is needed. The engine performance of DSP is about 33MIPS. Therefore, three separated stations

can be processed together. This can be attained by accessing three accumulators 46a, 46b, and 46c by time division multiplex (time sharing). The signal pulses 48a, 48b, and 48c shown in the right of an accumulator show the relative serial sampling under control of a clock 32.

[0023] The digital processing system after an FIR filter accumulator Digital demodulator 50a for eliminating a carrier signal from each input which decreased sharply, 50b, 50c, stereo decoder 52a that separates the right-and-left stereo signal supplied to each station, Digital sound processor 54a which adjusts a signal by functions, such as 52b, 52c, tone control, and volume control, It consists of digital-analog converters (DAC) 56a, 56b, and 56c (these DACs are considered as a part of sound processor ability) which change 54b, 54c, and the processed digital signal into analog format. Moreover, although the digital signal supplied to them is divided into different Rhine, DAC means that the time frame by which the multiplexer was carried out is occupied, and achieves a false rumor RUCHIPU REXX function. A DAC output is a continuous analog signal respectively symmetrically [ this ]. It connects with Loudspeakers 58a, 58b, and 58c or other output units, and this analog signal drives them, after being amplified suitably (not shown).

[0024] Generally a digital modulation, stereo decoding, and a sound processing facility are used for a single channel, and this is the above-mentioned Dieter. It is shown by Baecher. Programmable DSP acts on the data stream about each selected station independently by carrying out time sharing of the processing output. Thus, a signal processor can use two or more stations for coincidence a modulation, decoding, and carrying out an acoustical treatment. When used for the service band where two or more signal paths in programmable DSP differ, a different modulation algorithm is needed for each service band. When only a single service band like FM is received, it is used for each station as which the single algorithm was chosen.

[0025] The example of the multiplexer which can be used for a tuner 22 or an FIR filter is shown in drawing 3 . One input of each AND gates 60a, 60b, and 60c receives each signal from the output of the ** accumulators 28a, 28b, and 28c (for tuners 22), or the multipliers 38a, 38b, and ROMs 38c (for FIR filters) of each FIR. Other inputs of the AND gate will be in a sequential-operation condition by the time division multiplex based on a clock 32. The output from the AND gate is supplied to the input of the OR gate 62. This OR-gate output is a single data stream, and this stream contains the sample from the three AND gates 60a, 60b, and 60c by installation of time division multiplex.

[0026] The example of correction of the FIR filter which can be used when only FM reception of an a large number office is desired is shown in drawing 4 . Single FIR which stores the FIR multiplier used for FM service ROM38a supplies the multiplier to the compound multiplexer 42 directly. One FIR Since only ROM is used, it is not necessary to carry out the multiplexer of the output. However, the signal by which time division multiplex was carried out from the tuner 22 is still divided within Accumulators 46a and 46b and 46c, and those concrete properties are maintained at the time of the time-division-multiplex recovery of the next step, and an acoustical treatment.

[0027] In order to explain this invention, although some examples were explained, this contractor can perform various corrections and deformation to this invention. These modification is expected easily and does not deviate from the range and pneuma of this invention which are shown in a claim.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]
[Claim 1] A means digitize the analog RF signal which received in a compound radio-frequency (RF) receiver, a digital tuner means choose two or more request frequencies from said digitized signal based on time division multiplex, a digital filter means dissociate from the signal which has interfered in two or more request frequencies based on time division multiplex, and the RF receiver that are characterized by to provide a recovery, the digital recovery which carries out an acoustical treatment, and an acoustical-treatment means for said selected signal by the digital format.
[Claim 2] Said digital tuner means is an RF receiver according to claim 1 characterized by choosing two or more request frequencies from the separation RF service band mutually left in frequency.
[Claim 3] Two or more digital finite impulse response (FRI) filters with which said digital filter means contains respectively the filter coefficient memory corresponding to said each service band, The means which carries out time division multiplex of the contents of said FIR filter coefficient memory in digital one, And it has a means to control the multiplexer of said FIR filter coefficient memory synchronizing with the multiplexer of said digitized signal. The signalling frequency chosen to said service band by that cause is an RF receiver according to claim 2 characterized by being processed about said service band by the corresponding FIR filter coefficient memory.
[Claim 4] Said digital tuner means is an RF receiver according to claim 1 characterized by providing a means to choose two or more frequencies from a signal RF service band.
[Claim 5] Said acoustical-treatment means is an RF receiver according to claim 1 characterized by including a means to change into analog format said signal to which it restored.
[Claim 6] Said digital demodulator and an acoustical-treatment means are an RF receiver according to claim 1 characterized by providing the common digital signal processor (DSP) programmed to perform said digital recovery and a sound processing facility.
[Claim 7] An antenna means to receive a analog RF signal in a compound radio frequency (RF) receiving system, b) A means to digitize said analog RF signal which received, and a phase increment means to be c digital tuner means and to generate the request digital signalling frequency of 1 plurality, 2) The means which carries out time division multiplex of said request digital signalling frequency, 3) The sine coefficient memory which answers the applied signalling frequency and generates a digital sine signal, Apply the request digital signalling frequency by which the 4 aforementioned multiplexer was carried out to said sine coefficient memory, and the digital sine signal by which time division multiplex was carried out and as an output of said digital tuner means A tuner means to provide a means to generate on said request frequency, and the output and said digitized RF signal of the d aforementioned digital tuner means are mixed. A means to generate the digital RF signal by which time division multiplex was carried out, e) A digital finite impulse response (FIR) filter means to filter said digital RF signal by which the multiplexer was carried out, f) RF receiving system characterized by providing a means to restore to said filtered digital RF signal, and the means which carries out the acoustical treatment of the RF signal by which the g aforementioned recovery was carried out.
[Claim 8] Said FIR filter means is an RF receiving system according to claim 7 characterized by

including respectively the accumulator means used for each desired frequency, an FIR filter coefficient memory means, and a means to multiply said each digital RF signal by which the multiplexer was carried out by each FIR multiplier from said memory means and a means to send said multiplication result about said each request frequency to each accumulator.
[Claim 9] Said digital demodulator and a sound processor means are an RF receiving system according to claim 8 characterized by processing said each accumulator output separately.
[Claim 10] Said acoustical-treatment means is an RF receiving system according to claim 7 characterized by including a means to change into analog format said signal to which it restored.
[Claim 11] The step which receives a compound frequency RF signal in the RF receiving approach, The step which digitizes said input signal, and the step which generates the digital harmonic ringing respectively corresponding to two or more request RF frequencies by which time division multiplex was carried out, Said digital harmonic ringing is applied to said digitized input signal. The approach which restores to the step which offers the digital signal by which time division multiplex was carried out on said request frequency, and said digital signal by which the multiplexer was carried out by the digital format, and is characterized by having the step which carries out an acoustical treatment.
[Claim 12] Said digital signal by which time division multiplex was carried out is an approach according to claim 11 characterized by being filtered by the finite impulse response (FIR) in front of said digital recovery and an acoustical treatment.
[Claim 13] It is the approach according to claim 12 characterized by to provide the step which offers the set of an FIR multiplier by which said RF signal which received has the separation RF service band mutually left in frequency, said FIR filtering step corresponds to each service band, and time division multiplex is carried out synchronizing with the multiplexer of said digital RF signal, the step which apply the set of said FIR multiplier to each of that digital RF signal by which the multiplexer was carried out, and the step which accumulate said result separately.
[Claim 14] The step which filters said receiving RF signal by said FIR including two or more request frequencies in a single RF service band is an approach according to claim 12 characterized by providing the step which applies the set of an FIR multiplier to said digital RF signal by which the multiplexer was carried out, and the step which accumulates the result separately.
[Claim 15] It is the approach according to claim 12 which said FIR filtering step possesses the step which applies an FIR multiplier to said digital RF signal by which the multiplexer was carried out, and is characterized by performing said digital recovery and an acoustical-treatment step by the time-division-multiplex method in said accumulator.
[Claim 16] Said acoustical-treatment step is an approach according to claim 11 characterized by including the step which changes into analog format said signal to which it restored.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

## DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the basic method of this invention which processes to coincidence the RF signal received by two or more users.
[Drawing 2] Schematic drawing showing one example of this invention.
[Drawing 3] Schematic drawing of the multiplexer used for the system of drawing 2 .
[Drawing 4] Only a single service band is received here with the schematic drawing showing the FIR filter used in other examples.
[Description of Notations]
2, 14a, 14b, and14c [ -- A filter, 8 / -- 10 A demodulator, 44 / -- A demultiplexer, 12 / -- A loudspeaker, 46a, 46band46c / -- An accumulator, 22 / -- A compound coincidence tuner 52a, 52band52c / -- Stereo decoding, 54a, 54band54c / -- Sound processor ] -- An antenna, 4 -- A digitizer, 6 -- A tuner, 7

---

[Translation done.]

* NOTICES *



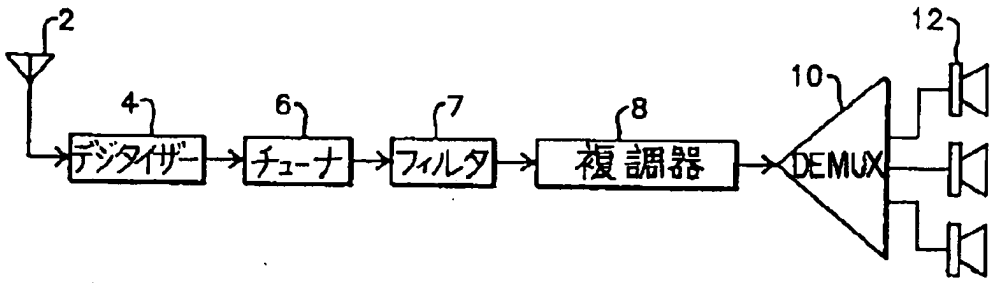
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

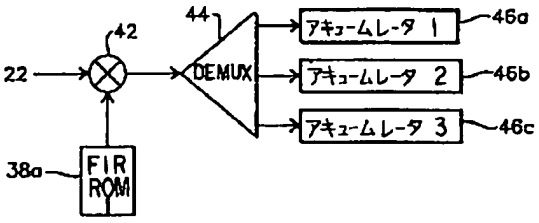
DRAWINGS

---

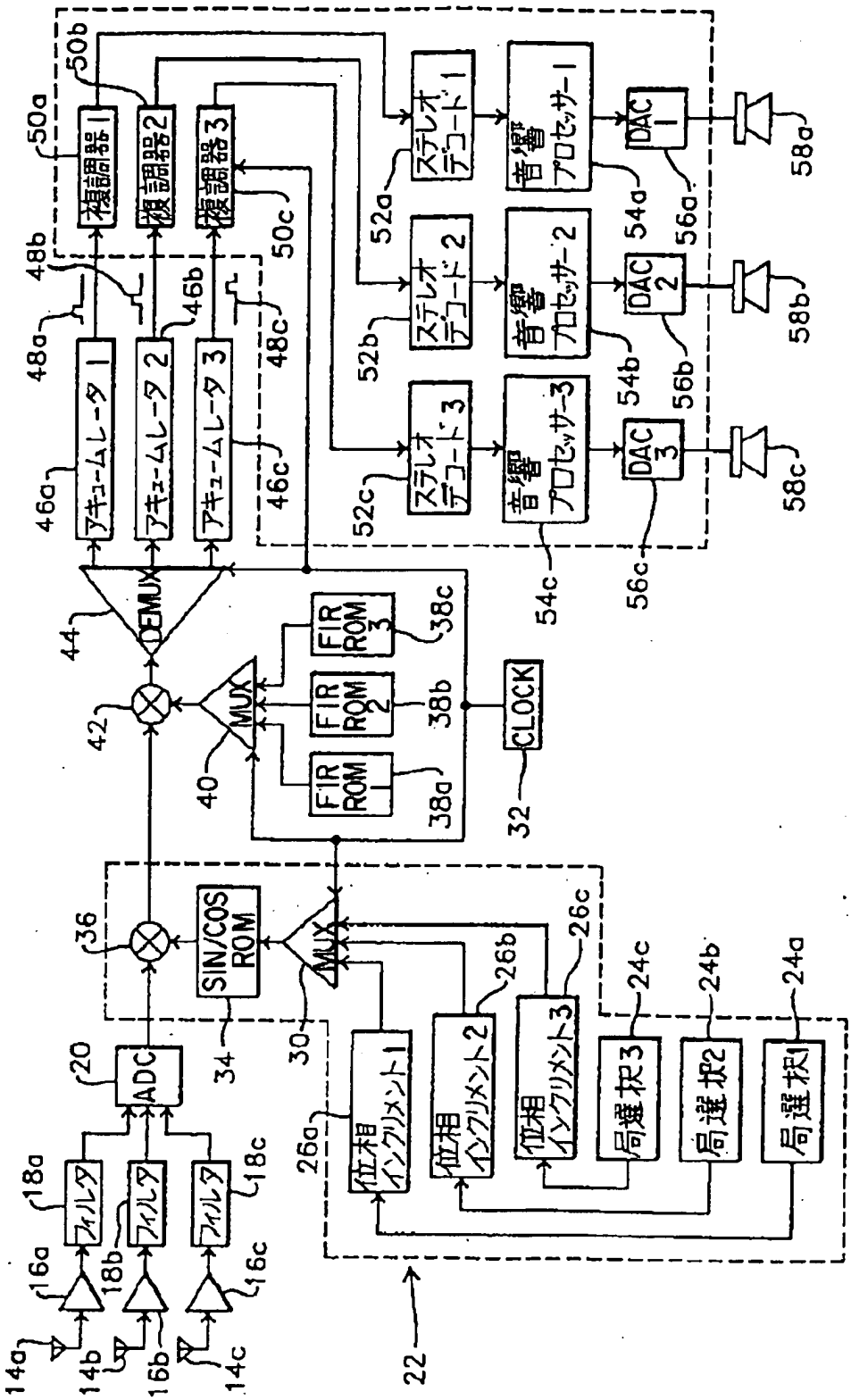
[Drawing 1]



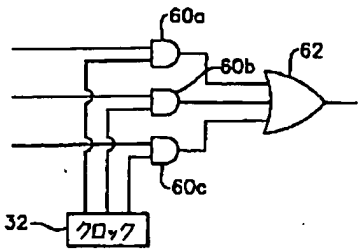

[Drawing 4]


22
42
44
DEMUX
アキュームレータ 1
アキュームレータ 2
アキュームレータ 3
46a
46b
46c
38a
FIR ROM

[Drawing 2]


14a
14b
16a
16b
14c
16c
18a
18b
18c
ADC
20
22
SIN/COS ROM
34
36
MUX
30
位相インクリメント1
位相インクリメント2
位相インクリメント3
26a
26b
26c
局選択1
局選択2
局選択3
24a
24b
24c
CLOCK
32
FIR ROM 1
FIR ROM 2
FIR ROM 3
38a
38b
38c
40
42
DEMUX
44
アキュームレータ1
アキュームレータ2
アキュームレータ3
46a
46b
46c
48a
48b
48c
50a
50b
50c
複調器1
複調器2
複調器3
ステレオデコード1
ステレオデコード2
ステレオデコード3
52a
52b
52c
音響プロセッサー1
音響プロセッサー2
音響プロセッサー3
54a
54b
54c
DAC 1
DAC 2
DAC 3
56a
56b
56c
58a
58b
58c

[Drawing 3]




---

[Translation done.]